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THE
CONTAGIOUS PARASITIC DISEASES
OF ANIMALS.

ISSUED BY THE
STATE BOARD OF HEALTH
OF MAINE.

The State Board of Health would feel grateful to any person for information at any time in regard to the existence in any part of the state of any of the contagious diseases of animals, or of any that may be suspected to be such.

Copies of this circular may be obtained by addressing

STATE BOARD OF HEALTH,

Augusta, Maine.

Contagious and Parasitic Diseases of Animals.

The law establishing the State Board of Health provides that "they shall investigate the causes of disease occurring among the stock and domestic animals in the State". To those who are aware of the close relationship which exists or may exist between the diseases of animals and those of man it will appear eminently fitting that the sanitary supervision of the state should not be restricted to human diseases. This idea of the inter-relation between the diseases of man and of animals rests upon the fact of the communicability to man, through contagion, of certain of the diseases of animals, and, vice versa, of the transmissibility of certain human diseases to animals; and of the further fact that the deterioration as a result of disease of the quality of the meat and milk supply may be a cause of human disease.

As far as concerns the transmission of diseases from the animal to man, or from man to the animal, it may be said that man is the greater sufferer in this exchange, for, whereas there are but few of the human diseases which may be given to animals, as diphtheria and tuberculosis, the number of animal diseases which may be communicated to man is considerably greater; among them may be mentioned glanders, tuberculosis, anthrax, rabies, foot-and-mouth disease, diphtheria, and actinomycosis. As affecting the food supply, not only the contagious diseases which have been enumerated, but other contagious and non-contagious maladies may render the meat or milk supply positively dangerous.

Aside from the questions of public health there are other important questions of human interest involved in the consideration of the contagious diseases of animals,—that is, the question of economics, of profit and loss. So far, we have been remarkably fortunate in our comparative exemption from those epizootic diseases which may swiftly and fatally sweep over a country, or which, like pleuro-pneumonia and tuberculosis, may more slowly and insidiously disseminate themselves. From either the more swiftly or from the more slowly spreading diseases, the pecuniary losses may be enormous. In England in

1865-6 the cattle plague destroyed 500,000 cattle; in France the loss among sheep from anthrax was until lately 20,000,000 francs annually; in Hungary in a few years, glanders destroyed 20,000 horses; swine plague has some years caused a loss of \$20,000,000 in the United States; and pleuro-pneumonia cost England during the first twenty-five years after its introduction into that country nearly \$500,000,000. These examples show how great a blow to our material prosperity the importation and failure to promptly prevent the spread of these animal plagues may bring us.

With the greater prevalence of some of these diseases in some of the states and countries from which importations of cattle and other animals are made, our continued exemption from these animal diseases can probably only be continued by means of laws touching this subject not far behind existing veterinary knowledge. But in addition to wise laws and systems of veterinary police the effectiveness of any such precautionary arrangement, as in human sanitary matters, must depend largely upon the intelligent watchfulness and coöperation for their own good, of the local authorities and of the people at large. To help somewhat in this direction, this circular is published for distribution among those who are interested in, or have the care of stock, and for those local authorities whose duty it is to guard against the spread of their contagious diseases. In it only those infectious diseases are mentioned which are liable to spread and assume the form of a serious and fatal epizootic, or which are specially dangerous to human life and health through their infective or parasitic qualities.

GLANDERS

Is a specific disease propagated by contagion and by contagion only; and never caused by exposure, poor feed and the other unfavorable conditions to which many horses are subjected. It is a disease affecting principally horses, but may be transmitted to man and to all the domestic animals except cattle, and must be considered incurable. The infectious principle which gives rise to the disease exists in the nasal discharges, in the expired air, and in the purulent discharges from the glanders ulcers. According as the disease affects principally

the nose, the lungs, or the skin, it is usually described as nasal, pulmonary or cutaneous glanders,—the last is known as farcy. According to duration, it is classed as acute or chronic. Acute glanders may terminate in from ten to fifteen days while the chronic form may last for months or years. The chronic or slow form is much the most common. Farcy or external glanders is usually the most rapid in its course. Nasal glanders is usually slower, but the pulmonary form of the disease is the most chronic, being often prolonged to two or three years before a fatal termination occurs.

The most characteristic symptoms of nasal glanders are these three : discharges from the nose, swelling of the glands beneath the jaw, and ulcers of a peculiar kind in the mucus membrane of the nostrils. The first,—the discharge from the nose,—taken alone, is not a trustworthy symptom, but with the presence of one or both of the others, we may be tolerably sure of the nature of the disease.

Pulmonary glanders may remain latent or concealed for a long time, —for months or years,—and all this time the diseased animal is a source of danger to his fellows and to the persons who care for him. During all this time the horse may appear to be in good condition, excepting some respiratory trouble which would be likely to be attributed to “heaves.” There is a “peculiar, weak, and dry cough ;” if, furthermore, other symptoms of glanders should develop, and if the animal in question is known or suspected to have been exposed to the contagion, and particularly if other horses after having been with this animal, show symptoms of glanders, we should have a strong suspicion of this disease and should take precautionary measures to prevent other animals from becoming affected.

In the external form of the disease, or farcy, some constitutional symptoms usually precede the local manifestations. The latter consist of circumscribed inflammatory swellings or “farcy buds.” These superficial tumors which appear more frequently where the skin is the thinnest,—inside the limbs, along the side of the neck, on the face,—soon soften and break, forming open, ragged, cup-shaped sores, or ulcers which have a constant tendency to enlarge, rarely to heal.

More than one of these three forms are often found in the same animal. Nearly every chronic case dies at last with the aggravated symptoms of the acute form.

As every case of glanders is a constant danger to every other horse which comes near him, and, to every person who cares for him, a

constant menace of death from a loathsome disease, it is evident that justice and humanity alike demand that every declared case of this disease be promptly destroyed, and every suspected case strictly quarantined. Every glandered horse which goes at large or is driven on the public roads endangers other animals through the medium of hitching-posts, watering troughs, and other things which the infected horse has come in contact with. Everything which may have become infected should be disinfected. Bedding and tainted hay or grain should be burned.

PLEURO-PNEUMONIA.

A contagious disease of the lungs and their coverings in cattle. Infectious Pleuro-Pneumonia is a disease which is noted for its vagaries. At one time it may be of a very malignant type, destroying life in a few days; at another it may assume a mild form. At one time, perhaps not more than five per cent. of the cattle exposed to the disease contract it, in other cases nearly all in a herd take the disease from a single infected animal. The period of incubation, that is, the time which elapses from exposure to the contagion to the appearance of the disease, is very variable, being sometimes not more than eight or nine days, or it may be three or four months before the disease shows itself. It is a particularly dangerous disease on account of its frequently insidious character. It may exist in animals for weeks, all the time exposing the well members of the herd to danger, before its dangerous nature is discovered. During this time, while it is in this latent or concealed form, the affected animals may appear to be in perfect health, or it may be noticed that there is a slight cough or that there is partial loss of appetite for a few days. Another circumstance which increases the danger of spreading the infection is that there may be an apparent recovery while the animal may still bear about with him the power of giving the disease to others for an indefinite time, some say as long as twelve or fifteen months.

In well marked cases of the disease the symptoms are similar to those produced by the ordinary non-contagious acute inflammations of the lungs and pleura;—loss of appetite, slight shivering, fever, roughening of the hair, an occasional cough which is dry and hard, breathing rough, harsh and painful, usually constipation, and, if a cow, diminution or cessation of the yield of milk.

There is nothing in these symptoms which is very distinctive and the history or suspicion of contagion is often required to complete the diagnosis. The disease may be confounded with tuberculosis, with the "lung-worm disease," or with the acute non-contagious lung inflammations.

Contagious pleuro-pneumonia is propagated in no other way than by infection. The poison is supposed to not be diffusible through the air to any great distance, so there is no danger of the spread of the disease to other herds except by the movements of cattle; therefore a rigid restriction should be put upon the movements of all cattle in infected regions, and both the diseased and suspected ones should be immediately slaughtered. No medical treatment should be thought of: such a course would be disastrous to both the individual owner and to the community. Sheds and stables in which the diseased animals have been kept are the most surely disinfected by burning. When so radical a method would prove too expensive, as it usually would, the building may be disinfected by sulphur fumigation on a large scale when the building can be made tight enough to hold the fumes. This fumigation should be very prolonged and repeated several times at intervals, and then followed by prolonged and thorough airing-out. Hay and grain which has been in infected barns should be burned or fed to horses.

Inoculation to prevent this disease has been practised considerably in some countries, but its efficacy is still disputed by eminent authorities, and many facts and opinions which have been recorded, especially during the last few years, seem to prove that the disease may sometimes be spread by the inoculated animals. Inoculation, therefore, should not be permitted in our State.

TUBERCULOSIS.

Tuberculosis or the "Pearl Disease" of cattle is essentially the same disease as human consumption. It is both contagious and hereditary, but contagion, in animals at least, is a greater factor in its propagation than heredity. Of the domestic animals, cattle and swine show the greatest predisposition to tuberculosis; though others are liable to contract the disease when exposed to its infection. Undoubtedly the contagion is received into the system, in the natural way, almost always by inhalation or by swallowing; experimentally, it is found

that it may be communicated to many kinds of animals by inoculation and by other methods. The period which elapses between the receipt of the infection and the appearance of the disease is usually very long. The course of the disease varies greatly, the symptoms developing either rapidly or slowly; hence we may have the disease lasting three months or less or extending over many months or years. In some cases it follows an insidious or concealed course, and quite extensive changes may occur in the lungs and other organs while yet the animal suffers but little change in its external appearance. Usually, however, it is seen that the animal is not benefited as he ought to be by his food. The appetite is often capricious, the skin looks dull and the hair dirty, cough may or may not be noticeable, when it is, it is more likely to be after taking food or drink, or being hurried. Later in the course of the disease loss of flesh is marked, the cough becomes troublesome, and there is often diarrhœa. In cows the flow of milk may not be much diminished until the disease has lasted some time.

The most characteristic appearance which is shown by a post mortem examination is that presented by the so-called "pearl tumors" or "grapes," as the butchers often call them. These tubercular new-formations vary in size from that of a pea or smaller to that of an egg. They are often confluent and one apparant mass may weigh several pounds, and the aggregate of these masses many pounds. These tubercles are found the most frequently in the lungs and on the smooth membrane which covers them; they are also often found on the membrane which covers the bowels.

Between tuberculosis and pleuro-pneumonia there are many points of resemblance. Both are contagious, the period of incubation in tuberculosis is long and it may be in pleuro-pneumonia, fever and the lung symptoms are common to both, the disease in both often assumes a concealed form, dangerous to the remainder of the herd from the difficulty of its recognition. When either disease is suspected, the determination of its character should be made by the veterinary surgeon.

Feeding experiments have conclusively shown that tuberculosis may be transmitted by means of the milk or flesh of diseased animals. Therefore prevention has to regard both the danger to other animals and to man. The milk from cows with this disease, even in its earliest stages, or when suspected, should never be used as human food. The flesh should never be used unless the disease is in its

earliest stages and is so localized that the tubercular growth can be entirely removed; even then, though it is not proved that the eating of such meat may give rise to the disease, there is a chance to doubt its wholesomeness and fitness as human food. As regards the animals, all diseased and suspected ones should be kept from other animals and the diseased ones slaughtered. Infected stalls and mangers should be disinfected, and the safer way would be to remove the woodwork of the cribs and eating-boxes and replace them with new.

LUNG-WORM DISEASE.

(VERMINOUS BRONCHITIS). A disease caused by the development of a parasitic worm, the *Strongylus micrurus* in calves and the *Strongylus filaria* in lambs. Adult animals are sometimes infested. The symptoms presented are difficulty of breathing, especially when hurried, cough, usually hoarse and spasmodic, and in long continued cases debility and emaciation. During the paroxysms of cough masses of mucus are sometimes discharged which contain eggs, embryos, and the adult forms of the parasite. The disease may prove fatal in a few days or may last from two to four months. Its nature is to be determined by an examination with a lens or with the naked eye of the mucus which is discharged from the mouth and nose, or in case of death, by an examination of the interior of the windpipe and bronchial tubes. The parasites are white, filiform worms, looking very much like pieces of white thread, from one to two inches in length, according to the species with which we have to do, and may be found rolled up in considerable masses, or may pretty completely plug up the smaller air tubes. Deaths following bronchial or lung symptoms in calves or lambs should lead to a post mortem examination as to its cause. This trouble is more likely to be mistaken for pleuro-pneumonia or tuberculosis than for any other diseases.

As the disease may be communicated from the sick to the well by means of water, fodder, or pastures which have been contaminated with the parasites or their ova, all cattle or sheep suspected of having this disease should be carefully quarantined, and all known to have it should be slaughtered. The lungs and other parts containing the parasites, as well as any mucus coughed up, should be destroyed with fire. The ova, with which many of the parasites are filled, are hard to kill with chemicals.

SWINE PLAGUE.

This disease, or "hog-cholera," as it is commonly called, is an infectious disease which has been terribly destructive of swine in some parts of this country: in Illinois alone over three and a half million hogs were lost by it in the years 1877-8-9. The contagion of this disease is very easily diffusible, more so than that of most other contagious diseases of animals. It may be communicated directly from animal to animal, or indirectly by other animals which are not affected, or by means of the clothing of visitors, and there are reasons to believe that it may be spread by the wind. It is communicable to other animals than swine,—dogs, cats, lambs, mice, and chickens,—and from these it may be communicated again to hogs. In fatal cases the disease may last from a few hours to three or four weeks. In ordinary cases the brunt of the attack falls upon the lungs and larger intestine; therefore when a post-mortem examination is made the lungs are often found inflamed and more frequently the lining of the large intestine is found inflamed or ulcerated.

The most characteristic symptoms are great debility, want of appetite, or vitiated appetite for excrement, drooping of the ears and of the head, a tendency to bury the nose or the head in the bedding, rapid emaciation, weak and undecided and often staggering gait, very offensive smell, especially in severe cases before and after death, and rapid decomposition of the body after death. Most characteristic, however, is the diarrhœa with fetid and usually dark colored discharges. Instead of the diarrhœa, there is often constipation, especially early in the disease. Cough is a symptom when the lungs are affected.

To prevent the spread of the disease, separate the well from the sick. Avoid all the methods of spreading the contagion which are indicated above. Do not be in too great haste to refill the sty, for the freezing of winter will often fail to eradicate the infection from the premises. The "*Rouget*" of France is probably not identical with the swine-plague of America, therefore it is not prudent to employ here the method of inoculation which has been used for the former disease.

TRICHINOSIS.

The much written-about trichinosis of man is caused by eating pork containing *trichinae*. These are small parasitic worms, from 1-8 to 1-18 of an inch in length, encysted in the red or lean part of the meat. They are detected with difficulty with the unaided eye, but are readily discoverable, when present, by means of the microscope. These parasites, being eaten by man or animals in raw or partially cooked pork, are liberated from their capsules by the process of digestion, and then rapidly multiply. The innumerable multitude of the new progeny forthwith take up their line of march from the digestive tract, penetrating all the intervening tissues, until they reach the muscles in the various parts of the body.

Here they become encysted as the parent trichinae were in the meat which was eaten. The symptoms caused by the migration of the trichinae and their fixation in the substance of the muscles are feverishness, sudden swelling of the face, swelling of the muscles all over the body, muscular pains and lameness, usually diarrhoea. These symptoms have considerable likeness to those of typhoid fever and rheumatism, and the trichinous disease has undoubtedly sometimes been mistaken for these. The symptoms of trichinous infection in animals are less severe but resemble somewhat those in man. To prevent human infection one precaution only is needed,—*cook the pork thoroughly.*

FOOT-AND-MOUTH DISEASE.

Though rarely fatal, this disease is said to have caused nearly as much loss and trouble to the farmers of Great Britain as the contagious pleuro-pneumonia. It is contagious in a high degree; when introduced into a flock or herd but few of the exposed animals escape. It affects principally cattle, sheep and swine, but may be communicated to other animals, and to man by direct contagion or by using the milk from diseased cows. The contagion is not readily diffusible through the air, but is spread by means of direct contact, and by means of food, watering-troughs, litter, grounds and roads with which the diseased animals have come in contact, or it may be carried from animal to animal through the medium of infected hands or clothing.

The period of incubation, that is, the length of time between

exposure to the contagion and the outbreak of the disease, is usually two or three days but may be only one day or may be as long as ten or twelve days. After 24 or 48 hours of feverish symptoms, the characteristic eruption appears in the mouth and on the feet, and often on other parts of the body, particularly where the skin is not thickly covered with hair. As seen in the mouth, the eruption at first consists of whitish or yellowish blisters varying in size from that of a mustard seed to that of a bean. On the feet we find heat, redness, and swelling around the edge of the hoofs and especially towards the heel and in the space between the toes followed in one or two days by the blisters at these points. After the rupture of these vesicles, bright red and very tender ulcers are left, and by the coalescence of the vesicles these ulcers are often of considerable extent. The soreness of the mouth makes it impossible for the animals to take their accustomed food, and in the feet the pus may burrow and cause the loss of the hoof. This is not likely to be confounded with any other disease except the "Foot-Rot" of sheep and with "Ergotism" which has appeared in some of the States. In these diseases there are no mouth symptoms.

Very strict measures should be put in force to prevent the spread of the disease. Diseased animals should be isolated and guarded carefully. Persons not having the care of them should not be permitted to visit them, and the attendants should not visit other cattle, sheep, or swine. No sick animal must be permitted on roads or grounds where other animals may go. Food or bedding must not be moved from the infected premises and manure must be burned or plowed in on the infected farm. Grounds on which infected animals have run should be plowed with horses. The sale or use of infected milk should be strictly prohibited. A thorough cleansing and disinfection of everything infected should be followed by prolonged airing-out.

FOOT-ROT IN SHEEP.

This disease begins with an inflammation of the interdigital spaces and is followed by a swelling which may extend all the way around the edge of the hoof, and this inflammation soon runs on to suppuration, burrowing of pus, and may lead to separation of the hoof. The dis-

charge is purulent, very offensive, and is the medium for transmitting the disease to other flocks. This disease may be spread rapidly from animal to animal or from flock to flock until it becomes ruinous to the sheep-raising industry where it exists. It should not be confounded with the foot and mouth disease previously described.

Preventive treatment should consist in isolating all affected sheep and keeping all healthy ones away from them. Diseased animals must not be transported from place to place.

SHEEP-POX.

A contagious, eruptive disease of sheep resembling considerably human small-pox, and probably having some relationship to it. During some epizootics of this disease it has proved itself to be one of the most destructive of animal pests. It may be communicated to other animals. As in the allied disease in man, prompt isolation and "vaccination" have been found to be the two effective measures to be employed.

ANTHRAX.

(CARBUNCLE; SPLENIC FEVER; MALIGNANT PUSTULE; CHARBON.)
—This disease has prevailed but little in New England, but in some countries it has been a veritable scourge to the husbandman, attacking cattle, horses, sheep, and quite frequently other animals and man. Sixty or seventy per cent of the animals attacked die. The period of incubation is short, from a few hours to three or four days. The symptoms vary so much in different cases that no concise description of them can be given. The apoplectic form may kill in a few minutes or in several hours, the acute in a few hours or days, and other forms are slower in their course. There is usually evidence of severe blood poisoning, trembling, difficulty of breathing, dark purplish color of the mucus membranes, spasms or convulsions, coldness of the extremities, and death. After death the blood is often found dark and tarry, and dark, serous, or semi-gelatinous infiltrations are frequent. This disease is intensely contagious. Malignant pustule, the same disease, has often been communicated to man by handling wool or hides from animals which have had anthrax, and the disease may be carried from one animal to another by the bites of flies.

Preventive measures include strict quarantine of sick animals, immediate destruction with fire of the carcasses of the dead, or, when this is impracticable, very deep burial with fencing of the place to keep other animals from the spot, and very thorough disinfection of everything possibly contaminated.

RABIES.

Rabies, or Hydrophobia when it appears in man, is never generated spontaneously; but is due to inoculation by means of bites or otherwise from other rabid animals, usually carnivorous. In the dog, there is an incubative period of from three to six weeks after the bite is received before the first symptoms appear. The earliest symptoms consist in but little more than a change in the disposition and manners of the animal, with loss of appetite or sometimes a disposition to eat indigestible or repulsive substances. Later there comes the stage of excitement, during which the dog shows a tendency to range at large, attacking other animals as he goes. After a period of from four to eight days, death closes the scene with the paralytic or exhaustive stage. In some cases,—the “dumb” or “torpid” form of the disease,—the paralytic symptoms come on early. These cases are marked by the “dropping” of the lower jaw, thus rendering the animal unable to bite or bark. There is in this disease no fear of water, but there is a difficulty or inability to drink it. It is believed that many cases of so-called hydrophobia in man are due to the mental effect of the receipt of the bite. Therefore, for the sake of the peace of mind of such, the dog should not be killed, if he can be secured without danger to other persons. If he does not die within six or eight days it may be known that he was not rabid. If he should die, however, he may not have been rabid, but may have died of some other disease. Only the skilled veterinary or medical authority should decide this. The question regarding the protective power of Pasteur’s anti-rabic inoculation is not yet decided to the satisfaction of most physicians. Not more than half the persons bitten by rabid dogs have the disease, and of those bitten by suspected dogs not more than eight or ten per cent. have hydrophobia.

FOWL-CHOLERA.

The characteristic symptoms are: "Drooping of the wings, an unconquerable somnolence, on startling the animals and forcing them to open their eyes, they seem to wake as from a deep sleep, and soon the lids close again, and usually death occurs without any particular movements of the animal, and after a mute agony; at most its wings flutter a little as it dies."

The contagion of the disease is not diffusible through the air but seems to be quite fixed. It passes off from the diseased bird by means of the excrement, and infects other fowls by being taken into the body in the food and drink.

To prevent the disease, remove the infected droppings daily and disinfect the floor or ground. Remove promptly the diseased birds from the unaffected ones. Pasteur's inoculation for this disease has proved successful.

GAPES.

A disease of fowls caused by a parasitic worm, *Syngamus trachealis*, in the wind-pipe. This worm is of a red color, half an inch or more in length, forked or branched like a rudely drawn letter "Y," and attached to the mucus membrane of the bird's wind-pipe by means of suckers at the ends of the two upper branches of the "Y." The symptoms are, sneezing, coughing, suffocation and death. Suspicion of the nature of the disease may be verified occasionally by the bird's coughing up the worms, or by opening the wind-pipe. The life-history of the parasite briefly is this: The matured worm is full of eggs, and these, after the death of the parent, when falling upon moist ground or in water, hatch, and food, water, or earth-worms, infested with these minute larvæ, may carry them into the crops of healthy birds; or the *Syngami* coughed up, may be seized and swallowed. From the digestive tract they make their way to the lungs and ultimately into the wind-pipe.

Preventative measures are obviously the keeping of healthy birds from the sick, and from infected grounds. Burn all *syngami* found. Burn or bury deeply all dead fowls. Infected grounds may be treated liberally with salt, lime, ashes, or chemicals.

ACTINOMYCOSIS.

A contagious tumor affecting the head and face of cattle which until lately was considered to be cancerous or tubercular in its nature. It is caused by infection with a microscopic fungoid plant. It may be transferred to man and other animals.

DIPHTHERIA.

It is known to medical men and veterinarians, but not to the general public as it should be, that diphtheria is a disease of the domestic animals as well as a human disease. It has been known to prevail quite extensively and with fatal effect among cats, dogs, pigs, poultry and other animals. It is thought by some that many local outbreaks of this disease among children are referable to its prior existence in animals. In some cases the truth of this supposition has been verified.

CATTLE-PLAGUE.

(RINDERPEST.)—This disease in 1865-6, in eighteen months destroyed 500,000 cattle in Great Britain. When once it invades a country, unless prompt and vigorous stamping-out measures are employed, its extreme contagiousness makes its spread over the land rapid, and its malignancy is so great that the most of the cattle attacked die. The period of incubation is very short, and is followed by fever, an eruption on the mucous membrane of the mouth, and often a salmon-red or purple color of the mucous membranes. "Then ensue the urgent symptoms,—the drooping head, hanging ears, distressed look, rigors and twitchings of the superficial muscles, failing pulse, oppressed breathing, fetid breath, and the discharge from the nose, eyes and mouth."

Prompt slaughter of all diseased and suspected animals, thorough disinfection, and rigid quarantine of infected places,—nothing short of this is of any avail.